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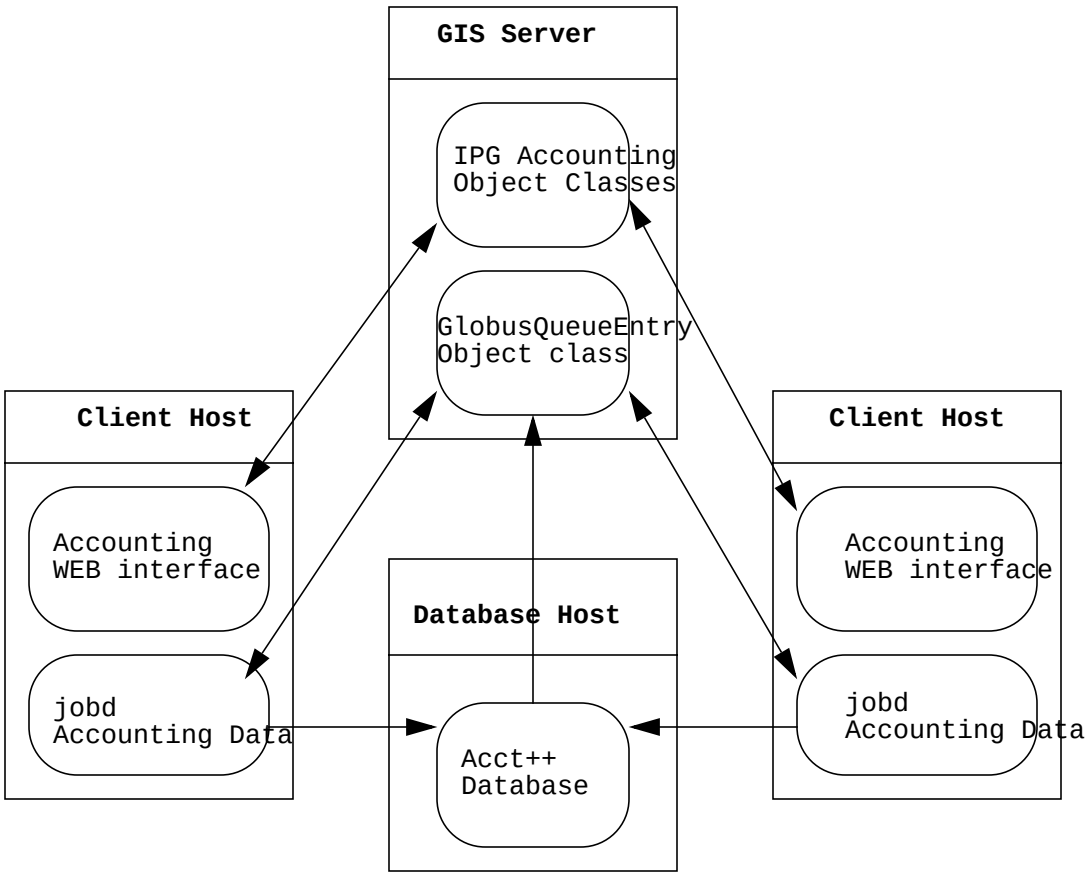
IPG Distributed Accounting System

The NASA Information Power Grid(IPG) is a testbed that provides access to a grid using the Globus software(see http://wwww.globus.org for more detail information on Globus). The resource usage information for the IPG jobs are collected using following schema. Jobs submitted using Globus Toolkit are posted on GIS Server under the GlobusQueyeEntry object class. The 'jobd' program running on each of the IPG hosts collects the resources usage information using the 'jobid' ID retrieved from the GIS server and saves the resource usage information in the 'jobs.dat.yyyymmdd' data file.

These IPG accounting data files are then loaded into the Acct++ database using the 'ipg_dlc' program. These accounting data are summarized by user and project by the daily cronjob and posted in the GIS server under Accounting Managers Object Class for user, project and allocations. These accounting data information is available to users through the WEB interface CGI program which queries the information from the GIS server and posts the output on the web through SSL channel.



Current IPG Accounting Model

Current IPG accounting model is based on the GIS server to retrieve the jobid information and collect the resource usage information from the system's process table using the jobid retrieved from the GIS server. This method has a sole dependency on the GIS server publishing the job information on the GIS server. So, it's not possible to collect the IPG job accounting information if the job is not published on the GIS server because the local accounting manager couldn't identify the IPG job from the regular job in the local jobmanager's resource log file.

In addition, there is 30 seconds of threshold value that current IPG accounting system will not be able to collect the resource usage information using the GIS server because job status information is pulled every 30 seconds.

URL to IPG Accounting WEB interface

Current IPG resource usage information can be query using the following web interfaces. It queries the information from the GIS server and return the output to the WEB server. Individual needs to be included in the ipg web server's password authorization file to access the WEB interface.

- IPG Accounting Query Form - To query the resource usage information by user/project.
- https://www.ipg.nasa.gov/cgi-bin/accts/ipg_accounting/ipgldap.cgi

- IPG Allocation Query Form - To query the allocation information.
- https://www.ipg.nasa.gov/cgi-bin/accts/ipg_accounting/allocldap.cgi

- IPG Resource Cost Query - To query the resource cost information.
- https://www.ipg.nasa.gov/cgi-bin/accts/ipg_accounting/rsrcName.cgi

GIS Server Accounting Object Class Layouts

Next few pages described the description of the current layout of accounting object class in the GIS server and the IPG Accounting WEB interface forms. There is no authentication or any security mechanism placed on the GIS server except the password authorization when user access the GIS server through the IPG accounting WEB interface.

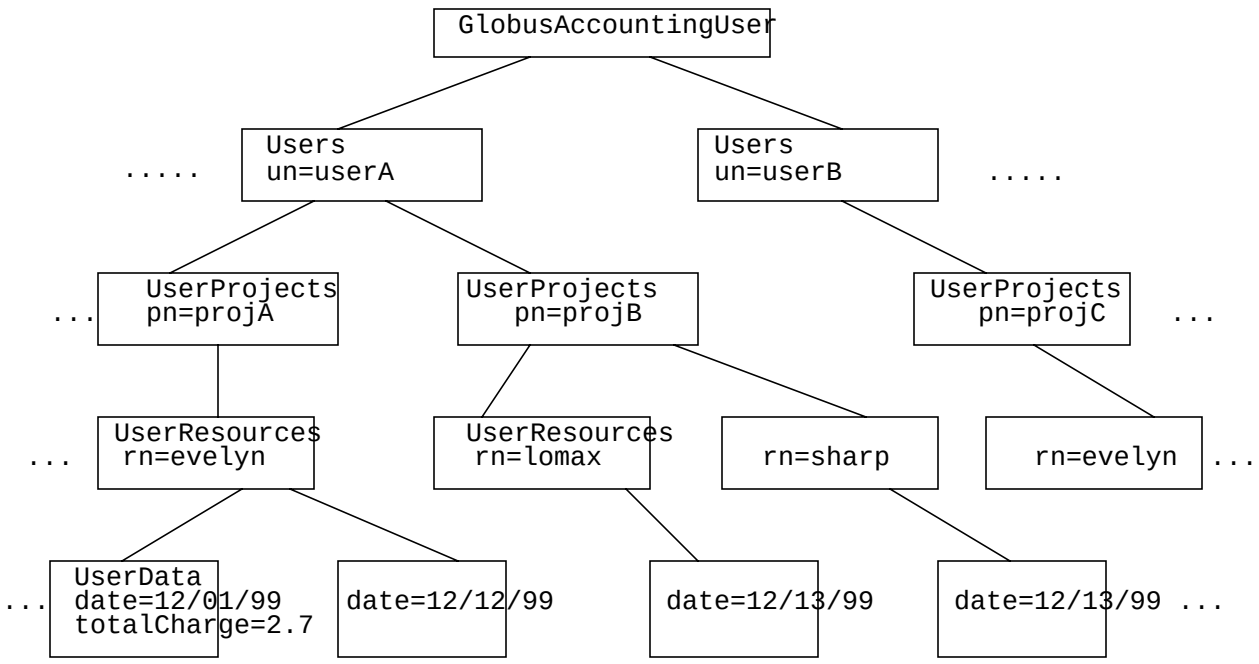
The ***GlobusAccountingUser*** object class contains summary of daily usage by user, projects, resources and date. It contains list of user name, project name, resource name, date and total charge. The detail usage information of each job will be stored in the Acct++ database.

```
objectclass GlobusAccountingUser
  requires
            objectclass
  allows
            cn,
            ou
objectclass Users
   requires
            un    #user name

objectclass UserProjects
   requires
            pn    #project name

objectclass UserResources
   requires
            rn    #resource name

objectclass UserData
requires
            totalCharge   # number of nodes * walltime
            date  #date of record
```

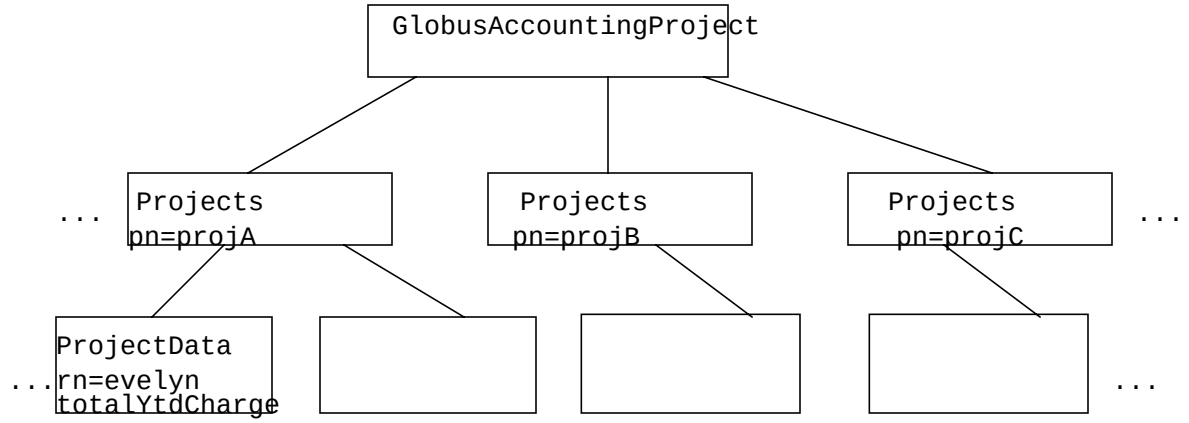


The ***GlobusAccountingProject*** object class contains year-to-date summary usage information by projects and resources. It contains list of project name, resource name and total YTD usage information.

```
objectclass GlobusAccountingProect
    requires
            objectclass
    allows
            ou

objectclass Projects
    requires
            pn              #project name

objectclass ProjectData
    requires
            totalYtdCharge  #sum of totalCharge by projectName
            rn              # Resource name
```

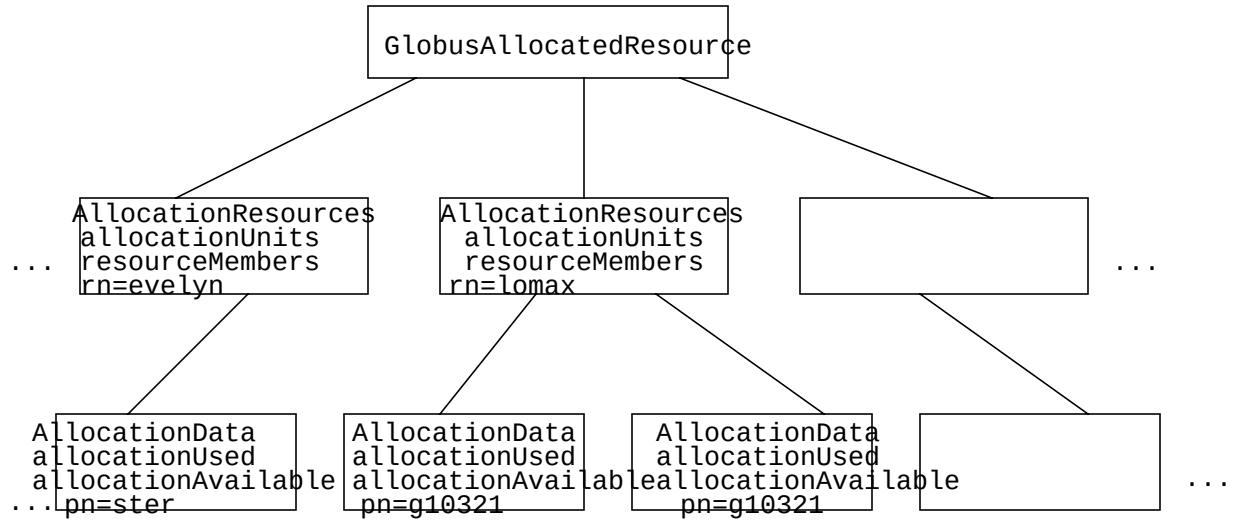


The **GlobusAllocatedResource** object class contains allocations information for a given resource name. It contains list of resource member(s), allocation units, project name, used allocation number, and available allocation number.

```
objectclass GlobusAllocatedResource
    requires
             objectclass
    allows
             ou

objectclass AllocationResources
    requires
            AllocationUnits   # Allocation Unit
            resourceMembers   # Member(s) of Resource Name
            rn                # Resource name

objectclass AllocationData
    requires
            allocationUsed         # Allocation unit used
            allocationAvailable    # Allocation unit available
            pn                     #project name
```



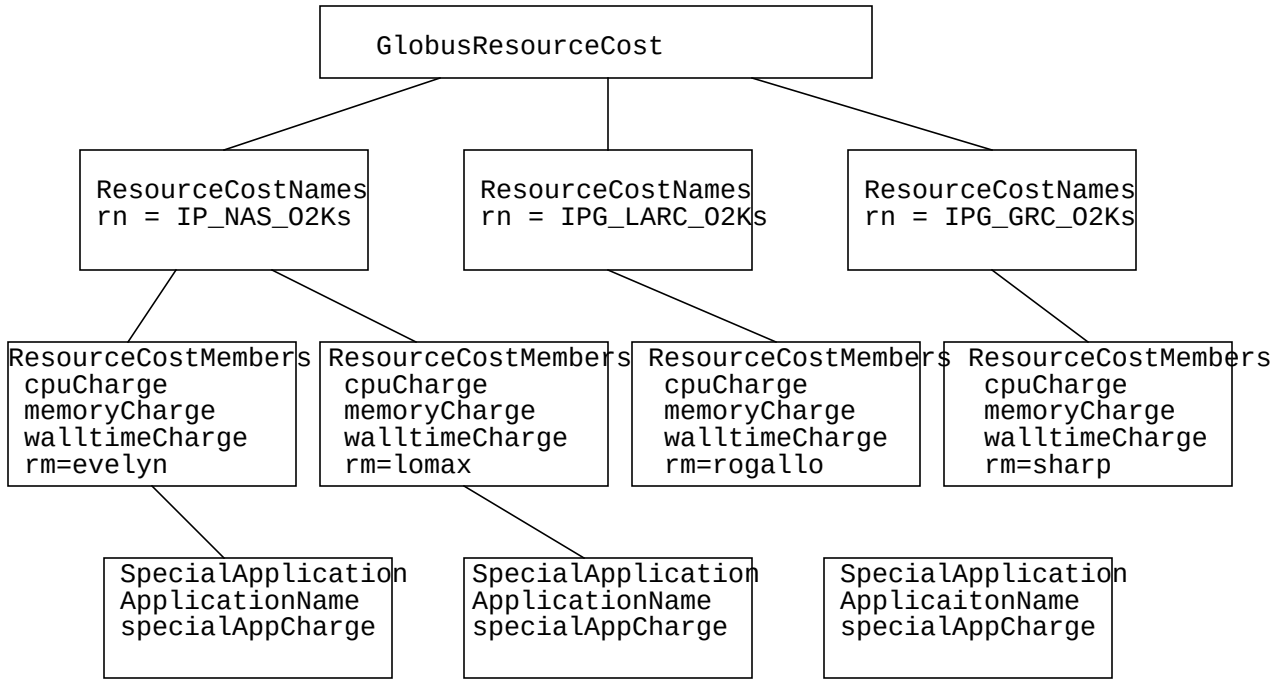
The ***GlobusResourceCost*** object class contains resource cost information for a given resource name. It contains list of resource member(s), cost information associated with resource name.

```
objectclass GlobusResourceCost
    requires
            objectclass
    allows
            ou

objectclass ResourceCostNames
    requires
            objectclass
            rn                  # Resource Name

objectclass ResourceCostMembers
    requires
            rm                  # Resource members
    allows
            cpuCharge           # Charge per Cpu
            memoryCharge        # Charge for memory
            walltimeCharge      # charge by wall clock

objectclass SpecialApplication
    requires
            ApplicationName     # Special Application name
            specialAppCharge    # Special Application Charges
```



Allocation API WEB interface Screen

IPG Allocation Query Form

Select Resource(s): IPG_NAS_O2Ks
IPG_LARC_O2Ks
IPG_GRC_O2Ks
....
....

Enter one or more project name(s) separated by blank spaces

Project Name: All

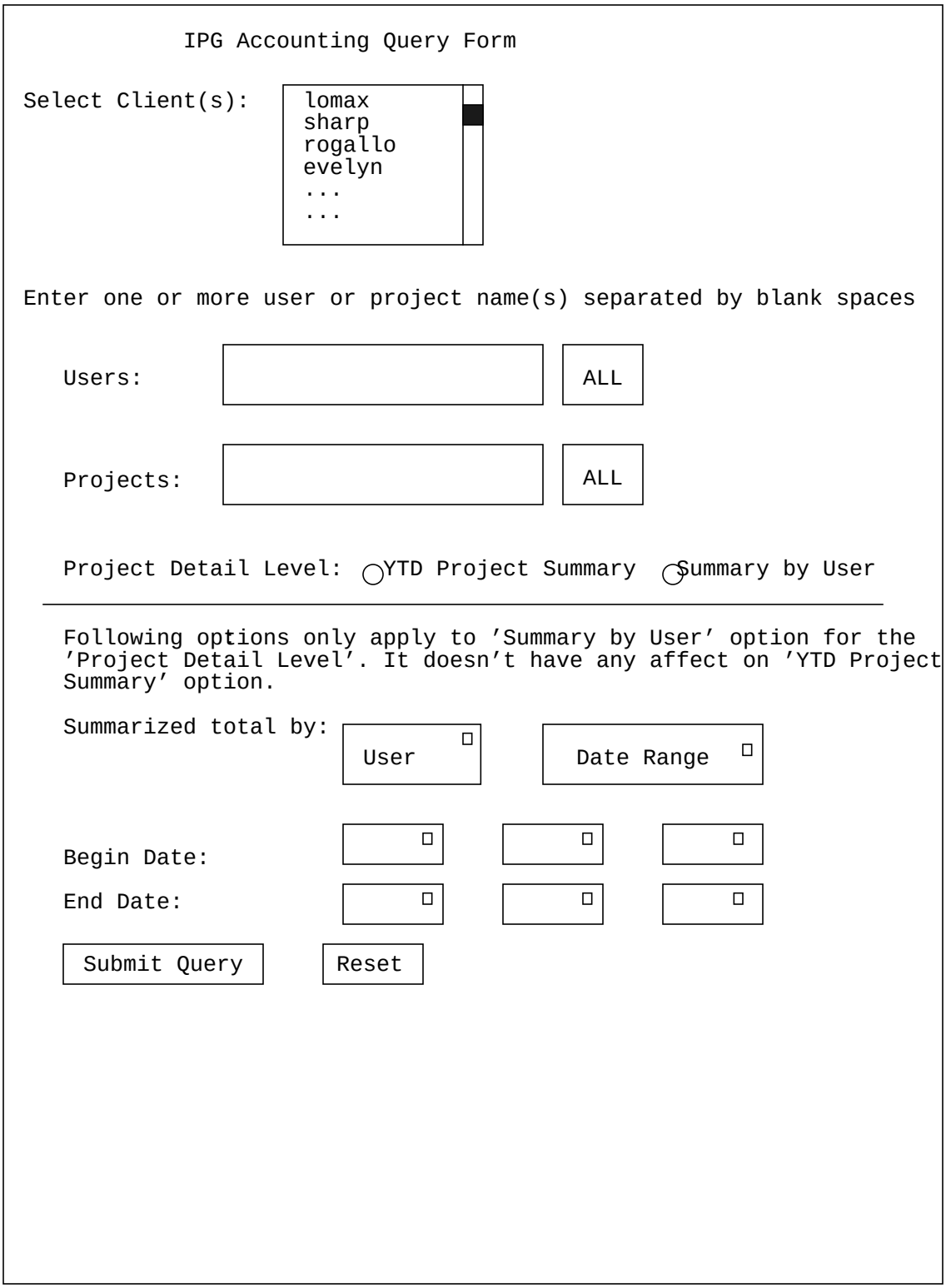
Submit

Query output

Allocation Information output

Resource Name	Allocation Units	Resource Members	Project Name	Allocation Used	Allocation Available
IPG_NAS_O2Ks	Node Hrs	Evelyn,..	ster	2000.00	500.00
....				....	

IPG Accounting Query WEB Interface Screen



Accounting Information Query Output

Accounting Information User Output

Date	User Name	Project Name	Hostname	Charge
12/06/99	Sarita Salm	meta1	rogallo	0.72

Another Query

Accounting Information Project Output

Project Name	Hostname	Total YTD Usage

Another Query

Resource Cost API WEB interface Screen

Resource Cost Query

Select resource name you wish to query quote and select 'continue' button

Resource name: IPG_NAS_O2Ks ... .

continue

Resource Name: IPG_NAS_O2Ks

Number of CPU:

Walltime: (hrs)

Memory: (Mb)

Special Application Name: ... MPI ...

Submit query Reset

Resource Cost query output

Resource Name: ipg_nas_o2ks

Host Name	Total Charge	Estimated End Time
evelyn	116	02/06/2001
lomax	192	02/06/2001
.....		

Detail Description

Host Name	Resource	Rate	Charge
evelyn	memory	1.0	50
	cpuCharge	1.0	16
	walltime	1.0	30
	mpi		20
Total			116
lomax	memory	2.0	100
	....		

Another Query

IPG accounting model based on GRID Accounting model

Next release of IPG accounting model will be based on the GRID accounting model which will not require individual user's to have a local login account on the local system to run the job. However, the resource usage information needs to be collected from the local jobmanager's log file using the following methods. Each center could chose any mechanism to collect the usage information from the local jobmanager's log file and credit the usage information to the user using the user's unique ID.

Mehod 1:

- Save the unique ID (Distinguish Name(DN) issued by an acceptable Certificate authorization) and jobid from the local jobmanager when the job is submitted through the globus to a specified logfile.
- Retrieve the resource usage information from the local jobmanager's resource log file using the jobid which was saved during the job submission.
- Credit the usage information to the unique ID.

Method2:

- Modify the current local jobmanager system to include the unique ID which identify the globus user in it's resource log file.
- Retrieve the resource usage information using the unique ID.
- Credit the resource usage information to the unique ID.